UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,697	11/20/2003	Ryoji Fukuhisa	JP920020182US1	8577

48583 7590 03/27/2006

BRACEWELL & PATTERSON, LLP
PO BOX 61389
HOUSTON, TX 77208-1389

EXAMINER	
DILLON, SAMUEL A	

ART UNIT	PAPER NUMBER
2185	

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,697	FUKUHISA ET AL.	
	Examiner	Art Unit	
	Sam Dillon	2185	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11/20/03* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 11-20-03

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Preliminary Amendment filed November 11, 2005. The instant application having Application No. 10/717,697 has a total of 19 claims pending in the application; there are 6 independent claims and 13 dependent claims, all of which are ready for examination by the examiner.

I. INFORMATION CONCERNING OATH/DECLARATION

2. The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in 37 C.F.R. ' 1.63.

II. STATUS OF CLAIM FOR PRIORITY IN THE APPLICATION

3. As required by M.P.E.P. ' 201.14(c), acknowledgment is made of applicant's claim for priority based on an application filed in November 20, 2003.

III. INFORMATION CONCERNING DRAWINGS

4. The applicant's drawings submitted November 20, 2003 are acceptable for examination purposes.

IV. ACKNOWLEDGEMENT OF INFORMATION DISCLOSURE STATEMENT

5. The information disclosure statement (IDS) submitted on November 20, 2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

6. As required by M.P.E.P. ' 609 (C), the applicant's submission of the Information Disclosure Statement dated November 20, 2003 is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by M.P.E.P. ' 609 C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

V. OBJECTIONS TO THE APPLICATION

7. **Claim 8** is objected to because of the following informalities:

a. **Claim 8** reads *"said detecting further comprises processing"* and should be amended to read *"said detecting **step** further comprises processing"*. Appropriate correction is required.

VI. REJECTIONS NOT BASED ON PRIOR ART

Claim Rejections – 35 USC ' 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. **Claims 18-19** are rejected under 35 U.S.C. 101 because the claimed inventions are directed to non-statutory subject matter.

10. **Claim 18**, as currently written, is non-statutory for being directed to a program, per se, not necessarily in an executable format (e.g., as currently claimed, it could be written out on a piece of paper or typed as a text file and thus be non-functional descriptive material) and even if in executable format not stored on an appropriate

medium to enable its functionality to be realized. To direct the invention to statutory subject matter, the program must be claimed as encoded or stored on a computer readable medium in an executable format.

11. **Claim 19**, as currently written, is non-statutory for being directed to a program, per se. The Examiner notes that this rejection is analogous to the 35 U.S.C. 101 rejection of Claim 18 above, and directs the Applicant to that rejection for further information.

VII. REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC ' 103 – Dixon, Ottesen and Bovet

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. **Claims 1-6, 9-15 and 18-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Dixon et al. *(US Patent Number 4,972,316)* in view of Ottesen et al. *(US Patent Number 6,281,676)* and Bovet et al. *("Understanding the Linux Kernel")*.

14. As per **Claim 1**, Dixon discloses a bad-sector search method, comprising:

a recording step *(column 8 lines 35-36)* whereby when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)* placed in a data recording device *(DASD, column 1 lines 5-*

10), an address *(information to tag what physical page is represented by cache page, column 3 lines 13-17)* of a sector where data reading is difficult *(has errors, column 9 lines 48-51)* is recorded *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)*;

Dixon does not disclose a determining step for determining whether or not the data recording device is executing a command; and a detecting step whereby if it is determined that the data recording device is not executing a command, the address of the sector is read from the memory to detect whether or not it is difficult to read data from each of surrounding sectors adjacent to the sector, the address of which has been read.

Otteson discloses a detecting step *(figures 3a through 4)* where the address of the sector *(column 4 lines 52-55)* is read *(column 5 lines 8-10)* from the memory *(registers, column 4 line 55)* to detect whether or not it is difficult to read data *(defective, column 4 lines 52-54)* from each of surrounding sectors *(neighboring zones, column 5 lines 8-10)* adjacent to the sector, the address of which has been read.

Bovet discloses

a determining step *(section 10.1.1, paragraph 1 lines 5-6)* for determining whether or not the device *(kernel, section 10.1.1, paragraph 1 line 2)* is executing a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)*; and

a detecting step *(section 10.1.1, paragraph 2 lines 9-11)* whereby if it is determined that the device is not executing a command *(interactive program,*

section 10.1.1, paragraph 2 line 2), a background process is run *(section 10.1.1, paragraph 2 lines 10-11)*.

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Otteson's cluster detection method *(figures 3a through 4)* in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Otteson's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Otteson's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Otteson's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster without hindering system performance, to obtain the invention of Claim 1.

15. As per **Claim 2**, Dixon, Otteson and Bovet disclose a bad-sector search method according to Claim 1, wherein:

if a number of steps of error recovery procedures executed for data recorded in the sector exceeds a predetermined specified value, or if the data cannot be read out *(Dixon, column 9 lines 11-14)*, said detecting step detects that data reading on the sector is difficult *(Dixon, column 9, lines 48-51)*.

The Examiner notes that only one of the following (or both) conditions is required by this claim: *"a number of steps of error recovery procedures executed for data recorded in the sector exceeds a predetermined specified value"* or *"the data cannot be read out"*.

16. As per **Claim 3**, Dixon, Otteson and Bovet disclose a bad-sector search method according to Claim 1, wherein:

if a new command *(Dixon, column 6 lines 38-41)* is not received *(Dixon, column 6 lines 38-41)* within a given period of time *(Bovet, time quantum, section 10.1.1, paragraph 1 line 4)* after the data recording device completed the execution of the last command, said determining step determines that a command is not being executed *(Bovet, section 10.1.1, paragraph 2 lines 4-7)*.

17. As per **Claim 4**, Dixon, Otteson and Bovet disclose a bad-sector search method according to Claim 1, further comprising:

an interruption step *(Bovet, section 10.1.1, paragraphs 1-2)* for immediately interrupting *(Bovet, section 10.1.1, paragraph 1 lines 2-4)* the

detecting step when the data recording device receives a command *(Dixon, column 6 lines 38-41)*.

18. As per **Claim 5**, Dixon discloses a bad-sector search method, comprising:

a bad sector recording step *(column 8 lines 35-36)* whereby when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)* placed in a data recording device *(DASD, column 1 lines 5-10)*, a bad sector is detected *(has errors, column 9 lines 48-51)*, and then an address *(information to tag what physical page is represented by cache page, column 3 lines 13-17)* of the bad sector is recorded *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)*;

Dixon does not disclose a determining step for determining whether or not the data recording device is executing a command; a detecting step whereby if it is determined that the data recording device is not executing a command, addresses of surrounding sectors adjacent to the bad sector, the address of which is recorded in the memory, are recorded in the memory, and then whether or not each of the surrounding sectors is a bad sector is detected; and a bad-surrounding-sector recording step whereby if the surrounding sector is not a bad sector, the address of the surrounding sector is deleted from the memory, and if the surrounding sector is a bad sector, the address of the surrounding sector is recorded in the memory as a bad sector.

Otteson discloses

recording *(column 4 lines 52-55)* addresses of surrounding sectors *(neighboring zones, column 5 lines 8-10)* adjacent to the bad sector in the memory *(registers, column 4 line 55)*, and then whether or not each of the surrounding sectors is a bad sector is detected *(column 4 lines 52-54)*; and

a bad-surrounding-sector recording step *(figures 3a through 4)* whereby if the surrounding sector is a bad sector *(defective, column 4 lines 52-54)*, the address of the surrounding sector is recorded *(column 4 lines 52-55)* in the memory as a bad sector *(SAT-site, column 4 lines 52-55).*

Bovet discloses

a determining step *(section 10.1.1, paragraph 1 lines 5-6)* for determining whether or not the device *(kernel, section 10.1.1, paragraph 1 line 2)* is executing a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)*; and

a detecting step *(section 10.1.1, paragraph 2 lines 9-11)* whereby if it is determined that the device is not executing a command *(interactive program, section 10.1.1, paragraph 2 line 2)*, a background process is run *(section 10.1.1, paragraph 2 lines 10-11).*

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Otteson's cluster detection method *(figures 3a through*

4) in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Otteson's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Otteson's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Otteson's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster without hindering system performance, to obtain the invention of Claim 5.

19. As per **Claim 6**, Dixon, Otteson and Bovet disclose a bad-sector search method according to Claim 5, wherein:

> if a number of steps of error recovery procedures executed for data recorded in the sector exceeds a predetermined specified value, or if the data cannot be read out *(Dixon, column 9 lines 11-14)*, said detecting step detects that data reading on the sector is difficult *(Dixon, column 9, lines 48-51)*.

The Examiner notes that only one of the following (or both) conditions is required by this claim: *"a number of steps of error recovery procedures executed for data recorded in the sector exceeds a predetermined specified value"* or *"the data cannot be read out"*.

20. As per **Claim 9**, Dixon, Otteson and Bovet disclose a bad-sector search method according to Claim 5, further comprising:

an interruption step *(Bovet, section 10.1.1, paragraphs 1-2)* for immediately interrupting *(Bovet, section 10.1.1, paragraph 1 lines 2-4)* the detecting step when the data recording device receives a command *(Dixon, column 6 lines 38-41)*.

21. As per **Claim 10**, Dixon, Otteson and Bovet disclose a bad-sector search method according to Claim 5, further comprising:

a step *(Bovet, process interruption, section 10.1.1, paragraph 1 lines 2-4)* for recording history information *(Bovet, need_resched field, section 10.1.1, paragraph 1 lines 4-6)* about an interrupted search *(Bovet, currently running process, section 10.1.1, paragraph 1 lines line 2)* for a bad sector in the memory,

wherein the detecting step is executed according to the history information recorded in the memory *(Bovet, section 10.1.1, paragraph 1 lines 5-6)*.

22. As per **Claim 11**, Dixon discloses a data recording device, comprising:

recording means whereby when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)*,

an address *(information to tag what physical page is represented by cache page, column 3 lines 13-17)* of a sector where data reading is difficult *(has errors, column 9 lines 48-51)* is recorded *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)*;

Dixon does not disclose determining means for determining whether or not a command is being executed; and detecting means whereby if it is determined that the command is not being executed, the address of the sector is read from the memory to detect whether or not it is difficult to read data from each of surrounding sectors adjacent to the sector, the address of which has been read.

Otteson discloses

the address of the sector *(column 4 lines 52-55)* is read *(column 5 lines 8-10)* from the memory *(registers, column 4 line 55)* to detect whether or not it is difficult to read data *(defective, column 4 lines 52-54)* from each of surrounding sectors *(neighboring zones, column 5 lines 8-10)* adjacent to the sector, the address of which has been read.

Bovet discloses

determining means *(kernel, section 10.1.1, paragraph 1 line 2)* for determining whether or not a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)* is being executed *(section 10.1.1, paragraph 1 lines 5-6)*; and

detecting means whereby if it is determined that a command *(interactive program, section 10.1.1, paragraph 2 line 2)* is not being executed *(section*

10.1.1, paragraph 1 lines 5-6), a background process is run *(section 10.1.1, paragraph 2 lines 10-11)*.

The Examiner reads the above claim language falling under 35 U.S.C. 112 6th paragraph as having the following structure, as per the specification: *"means for determining"* is found to be HDD 1 *(paragraph 31).*

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Otteson's cluster detection method *(figures 3a through 4)* in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Otteson's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Otteson's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Otteson's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster without hindering system performance, to obtain the invention of Claim 11.

23. As per **Claim 12**, Dixon, Otteson and Bovet disclose a data recording device according to claim 11, wherein:

if the number of steps of error recovery procedures executed for data recorded in the sector exceeds a predetermined specified value, or if the data cannot be read out *(Dixon, column 9 lines 11-14)*, said detecting means detects that data reading on the sector is difficult *(Dixon, column 9, lines 48-51)*.

24. As per **Claim 13**, Dixon, Otteson and Bovet disclose a data recording device according to claim 11, wherein:

if a new command *(Dixon, column 6 lines 38-41)* is not received *(Dixon, column 6 lines 38-41)* within a given period of time *(Bovet, time quantum, section 10.1.1, paragraph 1 line 4)* after the execution of the last command was completed, said determining means determines that a command is not being executed *(Bovet, section 10.1.1, paragraph 2 lines 4-7)*.

25. As per **Claim 14**, Dixon, Otteson and Bovet disclose a data recording device according to claim 11, further comprising:

interruption means whereby on receipt of a command *(Dixon, column 6 lines 38-41)*, operation of the detecting means is immediately interrupted *(Bovet, section 10.1.1, paragraphs 1 lines 2-4)*.

26. As per **Claim 15**, Dixon discloses a data recording device, comprising:

bad sector recording means whereby when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)*, a bad sector is detected *(has errors, column 9 lines 48-51)*, and then an address *(information to tag what physical page is represented by cache page, column 3 lines 13-17)* of the bad sector is recorded *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)*.

Dixon does not disclose command determining means for determining whether or not a command is being executed; surrounding sector recording means whereby addresses of surrounding sectors adjacent to the bad sector, the address of which is recorded in the memory, is recorded in the memory; bad-surrounding-sector detecting means for detecting whether or not each of the surrounding sectors is a bad sector; and bad-surrounding-sector recording means whereby if the surrounding sector is not a bad sector, the address of the surrounding sector is deleted from the memory, and if the surrounding sector is a bad sector, the address of the surrounding sector is recorded in the memory as a bad sector.

Otteson discloses

surrounding sector recording means whereby addresses of surrounding sectors *(neighboring zones, column 5 lines 8-10)* adjacent to the bad sector, the address of which is recorded *(column 5 lines 8-10)* in the memory, is recorded *(column 4 lines 52-55)* in the memory *(registers, column 4 line 55)*;

bad-surrounding-sector detecting means *(disk drive data storage device, column 2 lines 37-38)* for detecting *(column 4 lines 52-54)* whether or not each of the surrounding sectors is a bad sector *(defective, column 4 lines 52-54)*; and

bad-surrounding-sector recording means whereby if the surrounding sector is a bad sector *(defective, column 4 lines 52-54)*, the address of the surrounding sector is recorded *(column 4 lines 52-55)* in the memory as a bad sector.

Bovet discloses

command determining means *(kernel, section 10.1.1, paragraph 1 line 2)* for determining whether or not a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)* is being executed *(section 10.1.1, paragraph 1 lines 5-6)*.

The Examiner reads the above claim language falling under 35 U.S.C. 112 6th paragraph as having the following structure, as per the specification: *"means for determining"* is found to be HDD 1 *(paragraph 31)*; *"means for detecting"* is found to be HDD 1 *(paragraph 32)*.

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Otteson's cluster detection method *(figures 3a through 4)* in response to the storage device of Dixon finding an error, and additionally it

would be obvious to run Otteson's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Otteson's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Otteson's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster without hindering system performance, to obtain the invention of Claim 15.

27. As per **Claim 18**, Dixon discloses a program that permits a computer to realize functions of:

when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)* placed in a data recording device *(DASD, column 1 lines 5-10)*, recording *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)* an address *(information to tag what physical page is*

represented by cache page, column 3 lines 13-17) of a sector where data reading is difficult *(has errors, column 9 lines 48-51)*.

Dixon does not disclose determining whether or not the data recording device is executing a command; and if it is determined that the data recording device is not executing a command, reading the address of the sector from the memory to detect whether or not it is difficult to read data from each of surrounding sectors adjacent to the sector, the address of which has been read.

Otteson discloses

reading *(column 5 lines 8-10)* the address of the sector *(column 4 lines 52-55)* from the memory *(registers, column 4 line 55)* to detect whether or not it is difficult to read data *(defective, column 4 lines 52-54)* from each of surrounding sectors *(neighboring zones, column 5 lines 8-10)* adjacent to the sector, the address of which has been read.

Bovet discloses

determining whether or not the device *(kernel, section 10.1.1, paragraph 1 line 2)* is executing a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)*; and

if it is determined that the device is not executing a command *(interactive program, section 10.1.1, paragraph 2 line 2)*, a background process is run *(section 10.1.1, paragraph 2 lines 10-11)*.

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon and Bovet are analogous art in that they both deal with operating

systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Otteson's cluster detection method *(figures 3a through 4)* in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Otteson's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Otteson's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Otteson's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster without hindering system performance, to obtain the invention of Claim 18.

28. As per **Claim 19**, Dixon discloses a program that permits a computer to realize functions of:

when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording

medium *(storage media, column 1 lines 5-10)* placed in a data recording device *(DASD, column 1 lines 5-10)*, detecting *(has errors, column 9 lines 48-51)* a bad sector, and then recording *(column 10 lines 40-50)* an address *(information to tag what physical page is represented by cache page, column 3 lines 13-17)* of the bad sector in a memory *(cache 20, column 3 line 2)*.

Dixon does not disclose determining whether or not the data recording device is executing a command; recording, in the memory, addresses of surrounding sectors adjacent to the bad sector, the address of which is recorded in the memory; detecting whether or not each of the surrounding sectors is a bad sector; and if the surrounding sector is a bad sector, recording the address of the surrounding sector in the memory as a bad sector.

Otteson discloses

recording *(column 4 lines 52-55)*, in the memory *(registers, column 4 line 55)*, addresses of surrounding sectors *(neighboring zones, column 5 lines 8-10)* adjacent to the bad sector, the address of which is recorded in the memory;

detecting whether or not each of the surrounding sectors is a bad sector; and if the surrounding sector is a bad sector *(defective, column 4 lines 52-54)*, recording *(column 4 lines 52-55)* the address of the surrounding sector in the memory as a bad sector *(SAT-site, column 4 lines 52-55)*.

Bovet discloses

determining whether or not the device *(kernel, section 10.1.1, paragraph 1 line 2)* is executing a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)*.

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Otteson's cluster detection method *(figures 3a through 4)* in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Otteson's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Otteson's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Otteson's cluster detection method and Bovet's background

processes for the benefit of identifying all the errors in a cluster without hindering system performance, to obtain the invention of Claim 19.

<u>Claim Rejections - 35 USC ' 103 – Dixon, Ottesen, Stockman and Bovet</u>

29. **<u>Claims 5, 7-8 and 15-17</u>** are rejected under 35 U.S.C. 103(a) as being unpatentable over <u>Dixon</u> et al. *(US Patent Number 4,972,316)* in view of <u>Ottesen</u> et al. *(US Patent Number 6,281,676)* and <u>Bovet</u> et al. *("Understanding the Linux Kernel")* and Stockman *("Connected Components or COLORING program").*

30. As per **<u>Claim 5</u>**, <u>Dixon</u> discloses a bad-sector search method, comprising:

a bad sector recording step *(column 8 lines 35-36)* whereby when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)* placed in a data recording device *(DASD, column 1 lines 5-10)*, a bad sector is detected *(has errors, column 9 lines 48-51)*, and then an address *(information to tag what physical page is represented by cache page, column 3 lines 13-17)* of the bad sector is recorded *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)*;

Dixon does not disclose a determining step for determining whether or not the data recording device is executing a command; a detecting step whereby if it is determined that the data recording device is not executing a command, addresses of surrounding sectors adjacent to the bad sector, the address of which is recorded in the memory, are recorded in the memory, and then whether or not each of the surrounding

sectors is a bad sector is detected; and a bad-surrounding-sector recording step whereby if the surrounding sector is not a bad sector, the address of the surrounding sector is deleted from the memory, and if the surrounding sector is a bad sector, the address of the surrounding sector is recorded in the memory as a bad sector.

Otteson discloses that mechanical and non-mechanical surface damage can cause regions of adjacent bad sectors *(Otteson, column 4 lines 5-9 and figure 2 element 208)*.

Stockman discloses a method *(void propagate_color, page 2)* for identifying a region of sectors sharing the same attribute *('1's, page 1 lines 2-4)*, comprising

recording *(the recursion of the propagate_color function puts the parameters onto the memory stack when propagate_color is called on an adjacent sector (as in lines 9-12 of the function definition), fulfilling the limitation "recording ... in the memory")* addresses of surrounding sectors *(neighbors, function propogate_color, line 7)* adjacent to the bad sector in the memory, and then whether or not each of the surrounding sectors is a bad sector is detected *(function propogate_color, lines 9-12)*; and

a recording step *(function propagate_color, line 6)* whereby if the surrounding sector is a sector of the same attribute as the original sector *(function propagate_color, line 5)*, the address of the surrounding sector is recorded *(function propagate_color, line 6)* in the memory as a bad sector *(function propagate_color, line 6)*.

Bovet discloses

a determining step *(section 10.1.1, paragraph 1 lines 5-6)* for determining whether or not the device *(kernel, section 10.1.1, paragraph 1 line 2)* is executing a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)*; and

a detecting step *(section 10.1.1, paragraph 2 lines 9-11)* whereby if it is determined that the device is not executing a command *(interactive program, section 10.1.1, paragraph 2 line 2)*, a background process is run *(section 10.1.1, paragraph 2 lines 10-11)*.

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon, Otteson and Stockman are analogous art in that Dixon and Otteson have an initial sector and a possible region containing that sector, and Stockman discloses an algorithm that takes a starting sector and determines the region containing that sector. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-19 and column 3 lines 1-4)*. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Stockman's cluster detection method *(void propagate_color, page 2)* to find the region predicted by Otteson in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Stockman's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson,*

column 4 lines 5-9), and Stockman discloses that his method will identify objects which are connected "blobs" of '1's in a background of '0's *(Stockman, page 1 lines 1-3)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Stockman's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Stockman's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster predicted by Otteson without hindering system performance, to obtain the invention of Claim 5.

31. As per **Claim 7**, Dixon, Otteson, Stockman and Bovet disclose a bad-sector search method according to claim 5, wherein:

said detecting step further comprises processing that deletes *(Stockman, return, function propagate_color, line 5)* an address of a sector *(Stockman, pixel, function propagate_color, line 6)*, a search *(Stockman, function call of itself, function propagate_color, lines 2-3)* for which has already been completed *(Stockman, already colored, function propagate_color, line 5)*, from the addresses of the surrounding sectors *(Stockman, the function propagate_color recursively calls itself on each sector surrounding the passed address (r,c), and the function will stop processing itself if it finds that the address it is told to test has already been tested (colored); Accordingly, this functionality fulfils the*

limitation "deletes and address ... from the address of the surrounding sectors recorded in the memory") in the memory.

32. As per **Claim 8**, Dixon, Otteson, Stockman and Bovet disclose a bad-sector search method according to claim 5, wherein:

said detecting further comprises processing whereby focusing on the two bad sectors adjacent to each other *(the Examiner interprets this claim language to mean in the case of claim 5 lines 12-14 of the preliminary amendment where a bad sector is found next to the original bad sector, in which case Stockman's function propagate_color will call propagate_color again on the original location, function propagate_color, page 2)*, each address of surrounding sectors adjacent to one bad sector is mutually compared with each address of surrounding sectors adjacent to the other bad sector, and one of duplicated surrounding sectors is deleted from the memory *(Stockman, if the propagate_color function is called on a sector that has already been visited, it immediately returns, function propagate_color, line 5)*.

33. As per **Claim 15**, Dixon disclose a data recording device, comprising:

bad sector recording means whereby when receiving *(column 6 lines 38-41)* a command *(column 6 lines 38-41)* that accesses a sector *(page, column 8 lines 35-36)* on a disk-shaped recording medium *(storage media, column 1 lines 5-10)*, a bad sector is detected *(has errors, column 9 lines 48-51)*, and then an address *(information to tag what physical page is represented by cache page,*

column 3 lines 13-17) of the bad sector is recorded *(column 10 lines 40-50)* in a memory *(cache 20, column 3 line 2)*; and

detecting means *(processor 12, figure 1)* for detecting *(column 9 lines 48-51)* whether or not a sector is a bad sector *(has errors, column 9 lines 48-51)*

Dixon does not disclose command determining means for determining whether or not a command is being executed; surrounding sector recording means whereby addresses of surrounding sectors adjacent to the bad sector, the address of which is recorded in the memory, is recorded in the memory; and bad-surrounding-sector recording means whereby if the surrounding sector is not a bad sector, the address of the surrounding sector is deleted from the memory, and if the surrounding sector is a bad sector, the address of the surrounding sector is recorded in the memory as a bad sector.

Otteson discloses that mechanical and non-mechanical surface damage can cause regions of adjacent bad sectors *(Otteson, column 4 lines 5-9 and figure 2 element 208)*.

Stockman discloses a method *(void propagate_color, page 2)* for identifying a region of sectors sharing the same attribute *('1's, page 1 lines 2-4)*, comprising

recording means whereby addresses *(r and c of each function call, function propagate_color, lines 9-12)* of surrounding sectors *(4-neighbors, function propagate_color, line 8)* adjacent to the bad sector, the address of which is recorded in the memory, is recorded in the memory *(the recursion of the propagate_color function puts the parameters onto the memory stack when*

propagate_color is called on an adjacent sector (as in lines 9-12 of the function definition), fulfilling the limitation "is recorded in memory");

recording means whereby if the surrounding sector is a sector of the same attribute as the original sector *(function propagate_color, line 5)*, the address of the surrounding sector is recorded *(function propagate_color, line 6)* in the memory *(image object in memory, function propagate_color, line 6)* as a similar sector.

Bovet discloses

command determining means *(kernel, section 10.1.1, paragraph 1 line 2)* for determining whether or not a command *(process with higher dynamic priority, section 10.1.1, paragraph 1 line 1-2)* is being executed *(section 10.1.1, paragraph 1 lines 5-6)*.

The Examiner reads the above claim language falling under 35 U.S.C. 112 6th paragraph as having the following structure, as per the specification: *"means for determining"* is found to be HDD 1 *(paragraph 31)*; *"means for detecting"* is found to be HDD 1 *(paragraph 32)*.

Dixon and Otteson are analogous art in that they both deal with detecting defects in disk drives. Dixon, Otteson and Stockman are analogous art in that Dixon and Otteson have an initial sector and a possible region containing that sector, and Stockman discloses an algorithm that takes a starting sector and determines the extent of a region containing that sector. Dixon and Bovet are analogous art in that they both deal with operating systems running multiple processes *(see Dixon, column 2 lines 15-*

19 and column 3 lines 1-4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initiate Stockman's cluster detection method *(propagate_color)* to find the region predicted by Otteson in response to the storage device of Dixon finding an error, and additionally it would be obvious to run Stockman's process as a background process *(Bovet, section 10.1.1, paragraph 2 lines 10-11)*, as taught by Bovet.

The motivation for doing so would have been that clusters of damaged sectors can occur when the cause is mechanical or non-mechanical surface damage *(Otteson, column 4 lines 5-9)*, and Stockman discloses that his method will identify objects which are connected "blobs" of '1's in a background of '0's *(Stockman, page 1 lines 1-3)*. Dixon states that a goal of his system is to provide transparency to the user *(Dixon, column 2 lines 15-19)* and to improve system performance *(Dixon, column 1 lines 36-38)*. Accordingly, the motivation for running Stockman's process as a background process would have been to allow the device to automatically interrupt the detection process when a command is received *(Bovet, section 10.1.1, paragraph 2 lines 4-8)*.

Therefore, at the time of the invention it would have been obvious to combine Dixon's system with Stockman's cluster detection method and Bovet's background processes for the benefit of identifying all the errors in a cluster predicted by Otteson without hindering system performance, to obtain the invention of Claim 15.

34. As per **Claim 16**, Dixon, Otteson, Stockman and Bovet disclose the data recording device according to claim 15, further comprising:

processing that deletes *(Stockman, return, function propagate_color, line 5)* an address of a sector *(Stockman, pixel, function propagate_color, line 6)*, a search *(Stockman, function call of itself, function propagate_color, lines 2-3)* for which has already been completed *(Stockman, already colored, function propagate_color, line 5)*, from the addresses of the surrounding sectors *(Stockman, the function propagate_color recursively calls itself on each sector surrounding the passed address (r,c), and the function will stop processing itself if it finds that the address it is told to test has already been tested (colored); Accordingly, this functionality fulfils the limitation "deletes and address … from the address of the surrounding sectors recorded in the memory")* recorded in the memory by the surrounding sector recording means *(Stockman, function propagate_color)*.

35. As per **Claim 17**. Dixon, Otteson, Stockman and Bovet disclose a data recording device according to claim 15, further comprising:

means whereby focusing on the two bad sectors adjacent to each other *(the Examiner interprets this claim language to mean in the case of claim 15 lines 12-14 of the preliminary amendment where a bad sector is found next to the original bad sector, in which case Stockman's function propagate_color will call propagate_color again on the original location, function propagate_color, page 2)*, each address of surrounding sectors adjacent to one bad sector is mutually compared with each address of surrounding sectors adjacent to the other bad sector, and one of duplicated surrounding sectors is deleted from the memory

(Stockman, if the propagate_color function is called on a sector that has already been visited, it immediately returns, function propagate_color, line 5).

IX. CLOSING COMMENTS

Conclusion

a. STATUS OF CLAIMS IN THE APPLICATION

36. The following is a summary of the treatment and status of all claims in the application as recommended by M.P.E.P. ' 707.07(i):

a(4). CLAIMS REJECTED IN THE APPLICATION

37. Per the instant office action, claims 1-19 have received a first action on the merits and are subject of a first action non-final.

b. DIRECTION OF FUTURE CORRESPONDENCES

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Dillon whose telephone number is 571- 272-8010. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

IMPORTANT NOTE

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sam Dillon
Examiner
Art Unit 2185

***

DONALD SPARKS
SUPERVISORY PATENT EXAMINER